DaimlerChrysler AG

Series of components for a vehicle seat

The invention relates to a series of components for a vehicle seat of a motor vehicle according to the precharacterizing clause of claim 1.

A cushion with a cushion core and an air- and moisture-permeable cover layer pulled over the latter is known from the German patent application with the official application number 102 43 315.16 and the application date of 09.18.2002, which has still not been published up to the application date of the present patent application. To improve the climate comfort, longitudinal and transverse grooves are formed in the surface of the cushion core, which surface is covered by the cover layer, said longitudinal and transverse grooves being spaced apart from one another, being open toward the cover layer and intersecting one another. In this case, the longitudinal and transverse grooves described are designed as ventilation ducts. In addition, ventilation channels which penetrate the full core thickness of the cushion core and, on the one hand, open in the intersecting points of longitudinal and transverse grooves and, on the other hand, open freely on the outside of the cushion core are provided in the cushion core. In addition, a fan for subjecting a central cushion region to air can be arranged either on that side of the cushion core which faces away from the cover layer, and at a distance from said cushion core, or in a channel completely penetrating the cushion core. The intensive air flow achieved thereby in the longitudinal and transverse grooves permits a rapid removal of heat and moisture.

DE 200 02 447 U1 discloses a seat cushion for vehicle seats, in particular for vehicle seats with a core part

made from a plastic foam. On its upper side facing a seat surface, the core part has duct-like depressions which bring about zonal weakenings and, as a result, configure the seat surface in accordance with the required pressure ratios. It is furthermore provided to permit, at least partially, a circulation of air in the duct-like depressions. Movement of the seat user on the seat cushion during the journey causes an air flow produced by a type of pumping action to arise in the duct-like system of the core part, said air flow transporting the moist air to the outside through a vertical opening in the foam cushion part. In order to reinforce the ventilation effect of the vehicle seat, a ventilator can additionally be arranged in the region of a lower mouth opening of a main duct which connects the duct-like depressions to a lower side lying opposite the seat surface. In contrast to a passively ventilated vehicle seat, the actively ventilated vehicle seat has the described main duct with the ventilator arranged therein. Accordingly, a passively ventilated vehicle seat is constructed in a structurally different manner from an actively ventilated vehicle seat.

DE 33 06 871 A1 discloses a cushion with an air-permeable cover layer. In the case of the cushion, ducts or flexible tubes which run on or in the core and have air-permeable walls bring about an intensified exchange of air in the regions on which a person is sitting, leaning or reclining, which prevents too great a rise in temperature of the cushion surface. The cushion has ventilation ducts which run in the seat region and/or backrest region and/or reclining region under the cover layer and which can be connected via ventilation channels which are arranged transversely thereto and, in turn, are connected to an air extraction means. According to the variant embodiment with the vertical ventilation channels, it is provided to let them either all open freely on an outside of a

seat shell or else to let all of the ventilation channels open freely on an inside of the seat shell and to extract the air from the inside of the seat shell via a main connecting hose.

The present invention is concerned with the problem of indicating an improved embodiment for a series of components for a vehicle seat of the type mentioned at the beginning, in which, in particular, a manufacturing process is simplified and/or made more economical.

This object is achieved by the subject matters of the independent claims, and advantageous refinements are the subject matter of the dependent claims.

The invention is based on the general concept, in the case of a series of components for a vehicle seat which has a cushion core with ventilation ducts running along and inside a seat surface and/or backrest surface, and with ventilation channels which are arranged essentially transversely thereto, of providing, in order to realize an either actively or passively ventilated vehicle seat, just one cushion core which can be adapted to particular requirements of an actively or a passively ventilated vehicle seat. In this case, the ventilation ducts communicate with the ventilation channels which are arranged essentially transversely thereto, penetrate the entire thickness of the cushion core and extend from the ventilation ducts as far as a rear wall facing away from the seat surface and/or backrest surface.

According to the invention, in order to realize a passively ventilated vehicle seat, the ventilation channels are connected in a flow-permeable manner to the surroundings via an opening in the rear wall, for example of a seat shell, whereas, in order to realize an actively ventilated vehicle seat, at least one fan, for example in the form of a ventilator or a miniature

ventilator, is provided and at least one of the ventilation channels being closed.

The solution according to the invention therefore provides a cushion core which can be used both for an active vehicle seat ventilation using ventilators, and also for a passive vehicle seat ventilation. In the case of the passive vehicle seat ventilation, the essentially horizontally running ventilation ducts on the upper side of the cushion core are supplied with air by the multiplicity of ventilation channels which are connected in terms of flow to the surroundings via an opening in the rear wall. In the case of the actively ventilated vehicle seat, a fan is additionally provided which is arranged, for example, within a ventilation channel or in the region of a mouth of the ventilation channel, that is to say in the region of the opening in the rear wall of the vehicle seat, and supplies the associated ventilation channel with air. In this case, some of the ventilation channels are of closed design, thus producing a circulation of the air blown in or extracted through the ventilators. The ventilator described can be designed here in a manner such that the direction of flow can be reversed.

The solution according to the invention therefore affords the great advantage of providing an identical basic cushion core both for a passively ventilated vehicle seat and for an actively ventilated vehicle seat, said basic cushion core being adapted in a further machining step to the respective requirements of the active or passive vehicle seat ventilation. As a result, the number of components to be provided is reduced, thus making it possible to save on costs and simplifying the manufacturing process.

According to a preferred embodiment of the invention, each cushion core has, on its rear wall, a flow-impermeable layer which, in order to realize the

passively ventilated vehicle seat, is pierced or removed in the mouth region of at least one ventilation channel. Accordingly, in the case of this variant embodiment, a cushion core is provided which corresponds in its basic design to that of the actively ventilated vehicle seat, and in the case of which it is only necessary to provide openings in the mouth region of at least one ventilation channel in order to adapt it to an actively ventilated vehicle seat. The provision of these openings can be achieved, for example, by a simple piercing or boring through of the flow-impermeable layer or else also by removing the flow-impermeable layer in the region mentioned.

According to an alternative embodiment of the solution according to the invention, each cushion core has, on its rear wall, a respective opening in the mouth region of the ventilation channels, of which, in order to realize the actively ventilated vehicle seat, at least one is closed. In this case, it is therefore envisaged providing a basic cushion core which is suitable without finishing work for a passively ventilated vehicle seat. For the actively ventilated vehicle seat, at least one of the rear-wall openings of the ventilation channels has to be closed, which can be achieved, for example, by simply sticking a film over the openings and/or by inserting a stopper into the ventilation channel.

According to an advantageous development of the solution according to the invention, the flow-impermeable layer can be designed as a plastic layer and/or as a felt layer. Plastic layers and felt layers can be produced cost-effectively and in virtually any desired embodiment and can be processed in a simple manner. While a plastic layer is designed in a manner such that it is virtually entirely flow-impermeable, in the case of the felt layer a very low flow permeability may also be specified, depending on the embodiment.

According to a particularly preferred embodiment of the invention, the plastic layer is designed as a film. A film of this type, preferably a self-sticking film, can be applied simply, rapidly and cost-effectively to the rear wall of the vehicle seat and, as a result, can reliably close the openings of the ventilation channels. At the same time, however, a subsequent removal or piercing of the film in order to open the ventilation channels is simply and easily possible.

According to an advantageous development of the invention, an arrangement of the ventilation ducts and/or ventilation channels is adapted to a body pressure distribution and/or to body contact points. This embodiment brings about an optimum adaptation of the ventilation capacity to the human anatomy or to the anatomy of a standard vehicle occupant. In this connection, for example, regions of the vehicle seat which are subjected to a heavier load, for example in the region of a human protuberance, can be ventilated better and, as a result, can have a positive influence on the well-being of the seat user.

A controllable ventilation channel closure can expediently be provided which interacts with the fan and permits either an active or a passive ventilation of the vehicle seat. A controllable ventilation channel closure of this type permits the realization of a vehicle seat which can be ventilated both passively and actively. For a passive vehicle seat ventilation, the fan is switched off and at the same time at least some of the openings of the ventilation channels are opened, whereas, for an active vehicle seat ventilation, the fan is switched on and at least some of the ventilation channels are closed. In this case, it is conceivable for a selection switch to choose between active and passive seat ventilation to be arranged, for example, on the dashboard or on the seat, said selection switch

controlling both the opening and the closing of the ventilation channels and also the switching off and on of the fan. The opening and closing of the ventilation channels can take place via a simple slide, for example a perforated plastic part offset with respect to the openings. Such a selection possibility choosing between active and passive vehicle seat ventilation increases the driving comfort and the functionality of the vehicle seat.

Further important features and advantages of the invention emerge from the subclaims, from the drawings and from the associated descriptions of the figures with reference to the drawings.

It goes without saying that the features mentioned above and those which have yet to be explained below can be used not only in the respectively stated combination but also in other combinations or on their own without departing from the context of the present invention.

Preferred exemplary embodiments of the invention are illustrated in the drawings and are explained in more detail in the descriptions below, with identical reference numbers referring to identical or similar or functionally identical components.

In the drawings:

Fig. 1 shows a plan view of a seat surface of a vehicle seat with ventilation ducts,

Fig. 2 shows a cross section through a seat surface of a cushion core according to the invention with passive seat ventilation,

Fig. 3 shows a cross section as in Fig. 2, but with active seat ventilation.

A vehicle seat 1 has, in a known manner, a seat part and a backrest, with only the seat part of the vehicle seat 1 being illustrated in illustrated Figs 1 to 3. However, the construction described below and the operation apply in the same manner to the backrest part of the vehicle seat 1.

According to Fig. 1, the seat part of the vehicle seat 1 has an upper seat surface 3, which can be relieved in a manner ergonomic for sitting, and a cushion core 2, which can be formed, for example, from a flexible plastic.

According to the invention, on its upper side facing the seat surface 3, the cushion core 2 has ventilation ducts 4 which run along and on the inside of the seat surface 3. In this case, the various ventilation ducts 4 can be arranged regularly and can form a "duct grid" 11. However, an arrangement of the ventilation ducts 4 which is adapted to a body pressure distribution and/or to body contact points is also conceivable.

According to Fig. 1, the ventilation ducts 4 run essentially in the region of the seat surface 3, but they may, however also be guided over a cheek region 14 of the motor vehicle 1.

Ventilation channels 5 are arranged transversely to the ventilation ducts 4 (cf. Figs 2 and 3), said ventilation channels penetrating the entire thickness of the cushion core 2 and extending from the ventilation ducts 4 as far as a rear wall 6 which faces away from the seat surface 3. The ventilation ducts 4 and the ventilation channels 5 can be directly formed during the foaming of the cushion core 2.

The special network formed from a duct grid 11 of ventilation ducts 4 and ventilation channels 5

communicating therewith ensures an effective transportation of the sweat moisture, produced by a vehicle occupant, essentially away from the seat surface 3, toward the rear wall 6 of the cushion core 2.

According to Fig. 1, the ventilation channels 5 open in intersecting points 15 of the ventilation ducts 4 or of the duct grid 11.

According to the invention, it is now provided, in order to realize a passively ventilated vehicle seat 1, to connect the ventilation channels 5 in a flow-permeable manner to the surroundings via an opening 7 in the rear wall 6. A continuous movement of the seat user on the seat surface 3 during the journey causes an air flow produced by a pumping action in the duct-like system of the ventilation ducts 4 and the ventilation channels 5, said air flow transporting the moist air through the openings 7 into the surroundings. For the passively ventilated vehicle seat 1 illustrated in Fig. 2, an additional ventilator 8 is advantageously not required.

By contrast, in order to realize an actively ventilated vehicle seat 1 according to Fig. 3, a ventilator or a fan 8 is provided and at the same time at least one of the ventilation channels 5 is closed. In this case, the closure of the ventilation channels 5 can take place by means of a flow-impermeable layer 9 which is arranged on the rear wall 6, or else by stoppers which are inserted into the particular ventilation channels 5. The fan 8 for the actively ventilated vehicle seat 1 according to Fig. 3 can be arranged either within the cushion core 2, i.e. within a correspondingly shaped ventilation channel 5, or else outside the cushion core 2 and spaced apart from the rear wall 6. A plurality of miniature ventilators (not illustrated) which are arranged in various ventilation channels 5 are also

conceivable here. The fan 8 can furthermore produce both a suction action and a pressure action within the duct system.

It is essential for the invention that the cushion core 2 is designed equally both for the actively ventilated and for the passively ventilated vehicle seat 1 and only has to be adapted subsequently to the particular requirements with regard to the actively or passively ventilated vehicle seat 1. This contributes substantially to reducing the multiplicity of parts and therefore to a lowering of the costs.

Two examples of possibilities for adapting the cushion core 2 to an actively ventilated or a passively ventilated vehicle seat 1 are to be explained below:

According to a first variant, it is provided that each cushion core 2 has, on its rear wall 6, a flow-impermeable layer 9 which, in order to realize the passively ventilated vehicle seat 1, is pierced or removed in the mouth region 10 of at least one ventilation channel 5. In this case, it is therefore provided to produce a cushion core 2 which is always identical and in which the mouth regions 10 of the ventilation channels 5 are closed at the factory by the flow-impermeable layer 9. If, in the case of extras, an actively ventilated vehicle seat 1 is desired, then openings 7 are subsequently bored and/or pierced through the flow-impermeable layer 9 in the mouth region 10 of the ventilation channels 5. It is also conceivable for the flow-impermeable layer 9 to have pre-punched regions in the region of the openings 7, which regions can be removed particularly easily, or for the entire layer 9 to be able to be removed or pulled off in a simple manner as a type of pull-off film.

According to a second variant embodiment, each cushion core 2 has, on its rear wall 6, a respective opening 7 in the mouth region 10 of the ventilation channels 5, with, in order to realize the actively ventilated vehicle seat 1, at least one of the openings 7 being closed. In this case, a cushion core 2 which is always identical is therefore produced which can be installed without changes in a passively ventilated vehicle seat 1. If, as an extra, an actively ventilated vehicle seat 1 is desired, then at least one opening 7 has to be closed, for example, by means of a stopper or by sticking it together or sealing it with a film or layer 9. Furthermore, the actively ventilated vehicle seat 1 additionally requires the above-described fan 8.

A plastic layer and/or a felt layer are suitable examples of a flow-impermeable layer 9, with it being possible for the plastic layer to be designed, for example, as a film. In particular, a self-sticking film affords the great advantage of being able to be applied simply and rapidly to the rear wall 6.

According to Fig. 3, in the case of the actively ventilated vehicle seat 1, at least one inflow channel 12 is provided through which ambient air passes into the vehicle seat 1, and at least one outflow channel 13 is provided through which air passes from the vehicle seat 1 into the surroundings. The definition of the inflow channel 12 or of the outflow channel 13 is oriented here to a flow direction of the fan 8. Generally, provision is made to arrange closed ventilation channels 5 between the inflow channel 12 and the outflow channel 13, so that an improved loop of the flowing air, i.e. improved circulation, is achieved within the cushion core 2.

For higher quality equipment lines, a controllable ventilation channel closure (not illustrated) can also be provided which interacts with the fan 8 and permits

either an active or passive ventilation of the vehicle seat 1. In the case of a passive ventilation of the vehicle seat 1, the fan 8 is switched off and at least a majority of the openings 7 in the mouth region 10 of the ventilation channels 5 is opened. For an active ventilation of the vehicle seat 1, the fan 8 is switched on and at the same time at least some of the openings 7 of the ventilation channels 5 are closed. The closing or opening of the ventilation channels 5 can take place, for example, by means of a grid of holes arranged offset with respect to the openings 7. Furthermore, both a manual and an automatic switching over between active and passive seat ventilation, for example by means of a switching element on the seat or on the dashboard, is conceivable here.

In summary, the essential features of the solution according to the invention can be characterized as follows:

The invention makes provision, in the case of a series of components for a vehicle seat 1 of a motor vehicle, to provide an identical cushion core 2 both for passive ventilation and for active ventilation, which cushion core has ventilation ducts 4 and ventilation channels 5 which are arranged transversely thereto, penetrate the entire thickness of the cushion core 2 and extend from the ventilation ducts 4 as far as a rear wall 6 facing away from the seat surface 3. In order to realize a passively ventilated vehicle seat 1, the ventilation channels 5 are connected in a flow-permeable manner to the surroundings, whereas, in the case of an actively ventilated vehicle seat 1, a fan 8 is additionally provided and at least one of the ventilation channels 5 is closed.

The solution according to the invention therefore affords the great advantage of just one identical cushion core 2 being provided both for the actively and

for the passively ventilated vehicle seat 1, said cushion core being able to be adapted in a simple manner to the respective requirements of a passive or active ventilation of the vehicle seat 1.